

## Chapter 3: Graphical Methods for Describing Data

Name \_\_\_\_\_

1. The order of the questions in a survey can affect the results. This is thought to occur because issues raised in one question can affect responses to later questions. In 1948 many people in the United States were concerned about the spread of communism as a political and economic philosophy. A survey given that year contained both of the following questions:
  - (i) Do you think the United States should let Communist newspaper reporters from other countries come in here and send back to their papers the news as they see it?
  - (ii) Do you think a Communist country like Russia should let American newspaper reporters come in and send back to America the news as they see it?

The following table contains the percentages of the Yes/No answers to question (i) given by respondents when asked these questions in different orders.

**Responses to Communist reporter question in 1948**

Question order	% Yes	% No
Question (i) asked first	37	63
Question (ii) asked first	73	27

- (a) Construct a comparative bar chart using these response percentages.

- (b) Do you think the order of the questions made a difference in the responses? Explain why or why not in a few sentences.

2. Desert organisms must cope with extreme and variable conditions. Their coping strategies frequently involve retreating to a sub-surface refuge. Researchers in New Mexico, investigating the underground shelter choices by Gila Monsters (*Heloderma suspectum*), hypothesized that depth might be a factor. They reasoned that deeper shelters would be less susceptible to extremes of heat and cold and thus depth would be preferred in a shelter. Depth data for 20 chosen shelters and 20 available shelters not chosen are presented in the table at right.

**Shelter Depths (cm)**

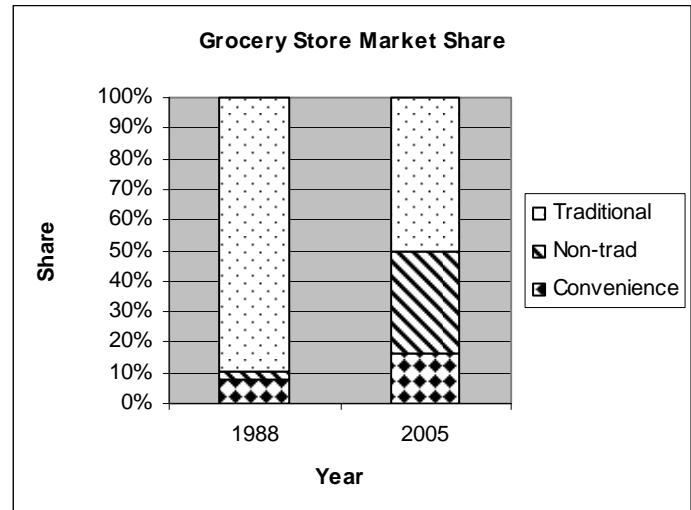
<b>Chosen</b>	<b>Nearest</b>	<b>Chosen</b>	<b>Nearest</b>
94	54	33	32
89	6	15	14
32	57	27	7
76	50	27	32
65	46	85	28
30	41	52	52
68	43	80	50
84	59	33	55
10	55	79	69
58	53	71	55

- a) Display these data using the a comparative (back-to-back) stem-and-leaf plot. Use the stems shown below, and be sure to include all information needed to compare the two distributions.

| 0 |  
| 1 |  
| 2 |  
| 3 |  
| 4 |  
| 5 |  
| 6 |  
| 7 |  
| 8 |  
| 9 |

- (b) Describe the similarities and differences between the chosen and not chosen shelter depths.
- (c) Are these data consistent with the researchers' expectations? Explain, using specific aspect(s) of your plot in part (a).

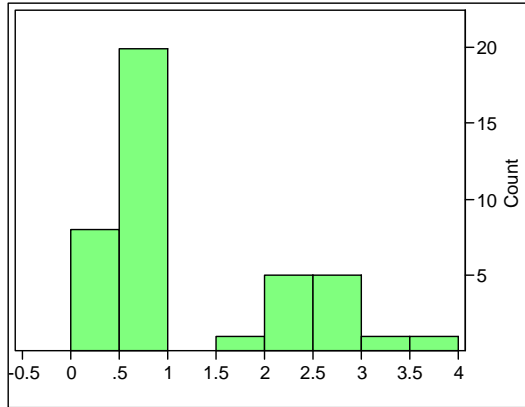
3. Grocery shopping habits have changed in recent years. “Non-traditional” volume stores such as Wal-Marts are now selling groceries. The stacked bar chart at right shows percentages of market share for Traditional, Non-traditional, and Convenience stores (e.g. gas stations) for 1988 and 2005.



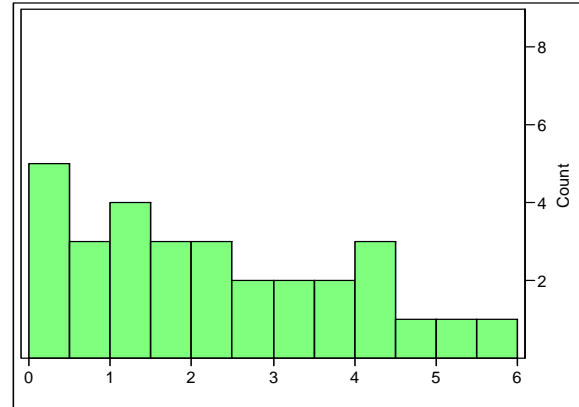
- (a) In a few sentences describe how the market share proportions have changed from 1988 to 2005.
- (b) The market share for which type of store has grown the most, compared to their market share in 1988. What aspect of the chart shows this?

4. Marine biologists have reported the discovery of a new species of fish in the Western North Atlantic. Data on the head length ( $n=41$ ) and pelvic fin length ( $n=30$ ) are shown below.

**Head Length (mm)**



**Pelvic Fin Length (mm)**

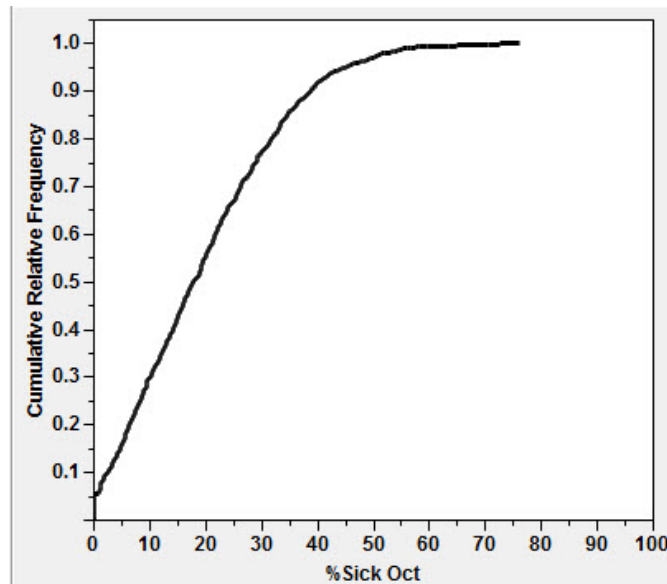


- a) Describe the distributions of these two variables using appropriate statistical terms.

- b) The distribution of head lengths appears to be rather strange. What do you think might account for the shape of this distribution?

5. During the first six months of the American Civil War armies were amassed as never before in history. Large groups of men, transported far from home, lived in conditions that bred sickness. In a recent study involving Confederate muster rolls, a researcher constructed a cumulative relative frequency distribution of the percentages of Confederate soldiers reported sick for each company. A “Company” is a unit of soldiers, usually between about 70 and 120 in size. The cumulative relative frequency distribution for October, 1861, is shown below.

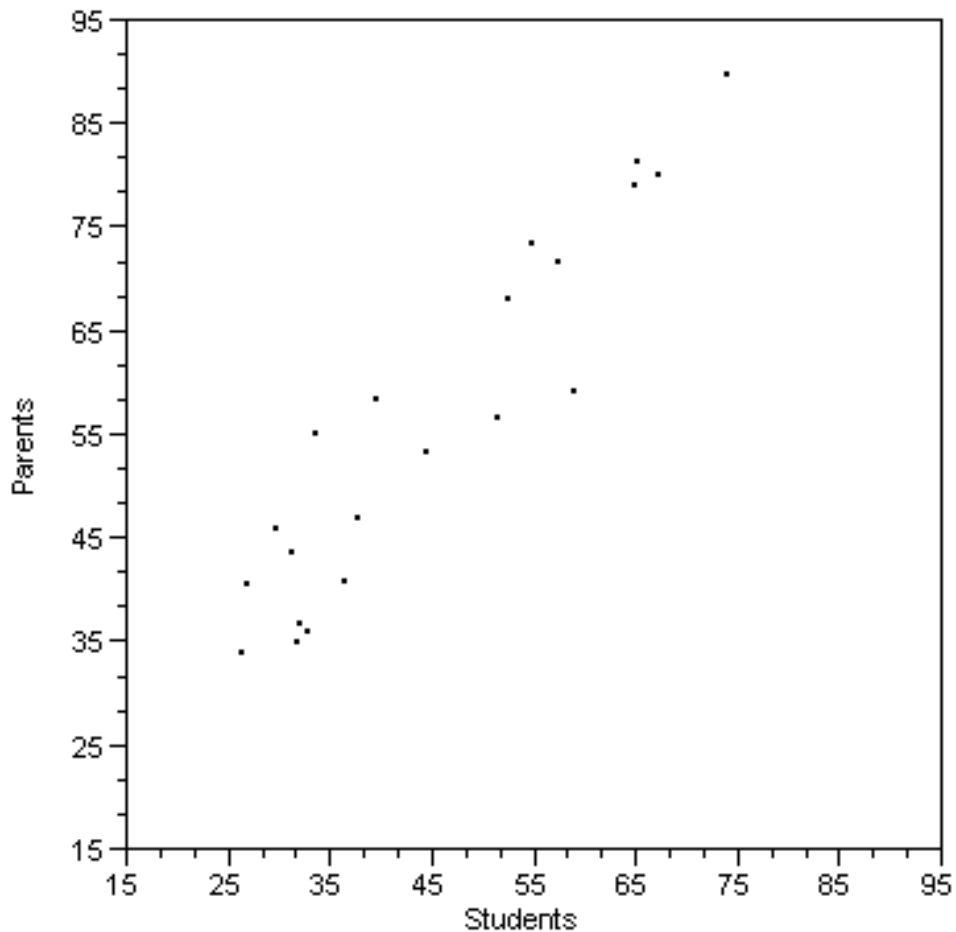
**Cumulative Relative Frequency Distribution**  
**Percentage reported sick by Company**  
**October, 1861**



- (a) Approximately what proportion of the Confederate companies had less than 10% sick?
- (b) Approximately what proportion of the Confederate companies had more than 30% sick?
- (c) Approximately 50% of the companies had less than what percentage of soldiers sick?

6. Investigators were interested in the communication about sex and related topics between parents and 12-14 year olds. The investigators asked students and parents whether or not they had communicated with their child/parent about topics such as pregnancy, how to say "no," and methods of contraception. A scatter plot of their data is presented below. Each point represents one topic listed by the investigators. For example, 72.4% of parents and 57.6% of adolescents said the parents had discussed childbirth. This would be recorded as the point (57.6, 72.4).

**Parents vs. Adolescents reporting of Discussion:  
Sex Education Topics (% Yes)**



- (a) On the graph above, sketch the line  $y = x$ , representing a line of "perfect agreement" between the parents and adolescents.
- (b) What is a possible explanation of the placement of the points in the scatter plot relative to the line you sketched in part (a)?